IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appellant:	Kevin M. Ferguson
Serial No.:	09/992,051
Filed:	November 21, 2001
For:	HUMAN VISION MODEL BASED SLOW MOTION INTERPOLATION
Examiner:	Trang U. Tran
Art Unit:	2622

Appeal Brief in Accordance With 37 C.F.R. § 41.37

Mail Stop Appeal Brief- Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

This is an appeal from the Examiner's final rejection of the above-identified application dated September 21, 2007.

No additional fee is believed due. However, if an additional fee is due please charge that fee to Deposit Account 20-0352.

Table of Contents

Real Party in Interest

The real party in interest in this case is Appellant's assignee, Tektronix, Inc., an Oregon corporation.

Related Appeals and Interferences

There are no prior and pending appeals, interferences or judicial proceedings known to Appellant, Appellant's legal representative or assignee which may be related to, directly affect or have a bearing on the Board's decision in this appeal.

Status of Claims

Claims 1, 3, and 5 stand rejected under 35 U.S.C. § 102(b) and are being appealed.

Claims 2, 4, and 6 stand rejected under 35 U.S.C. § 103(a) and are being appealed.

Status of Amendments

No amendments have been submitted by Appellant after the Examiner's final rejection.

Summary of Claimed Subject Matter

Independent claim 1 is in "means-plus-function" form. An apparatus for providing a smooth interpolated video signal at any desired rate from a slower rate video signal comprises:

means for up-sampling the slower rate video signal to the desired rate (See frame rate converter **12**, shown in Figure 1 and described at page 2, lines 21-22. The frame rate converter "up-samples the slower rate video signal to a desired higher rate video signal."); and

means for adaptively filtering the up-sampled signal using a human vision model. (See human vision model adaptive filter **14**, shown in Figure 1 and described at page 3, lines 17-24. The adaptive filter is a recursive filter architecture as shown in Fig. 2 of referenced U.S. Patent Application Serial No. 09/858,775 filed by the present inventor on May 16, 2001 entitled "Adaptive Spatio-Temporal Filter for Human Vision Model Systems.")

Claim 2 depends from claim 1. The apparatus further comprises means for restoring a direct current level to the smooth interpolated video signal. (See DC restore circuit **16**, shown in Figure 1 and described at page 3, lines 7-16. The DC restore circuit determines the DC level from the up-sampled slower rate video signal and adds that to the smooth interpolated video. The DC level may be a constant, may be based on the average picture level of the up-sampled slower rate video signal, or may be determined in any other way that is well known in the art.)

Claims 3 and 4 are analogous to claims 1 and 2 but in "apparatus" form.

Claims 5 and 6 are analogous to claims 1 and 2 but in "method" form.

Grounds of Rejection to be Reviewed on Appeal

Whether claims 1, 3, and 5 are unpatentable under 35 U.S.C. § 102(b) as being anticipated by Faroudja (U.S. Patent No. 5,428,398).

Whether claims 2, 4, and 6 are unpatentable under 35 U.S.C. § 103(a) as being unpatentable over Faroudja in view of Zhu et al (U.S. Patent No. 6,069,664) (hereinafter "Zhu").

Argument

Rejection of Claims 1, 3, and 5 under 35 U.S.C. § 102(b)

The Examiner rejected claims 1, 3, and 5 under 35 U.S.C. § 102(b) as being anticipated by Faroudja.

Appellant maintains that claims 1, 3, and 5 are not anticipated by Faroudja because Faroudja does not describe every element of claims 1, 3, and 5. "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." MPEP § 2131, citing *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

First, Faroudja does not describe "adaptively filtering the up-sampled slower rate video signal using a human vision model to produce the smooth interpolated video signal."

With regard to "adaptively filtering," the Examiner asserts that this limitation is met by Faroudja's non-linear enhancer 110. Appellant disagrees because **Faroudja's non-linear enhancer is not adaptive.** See column 10, line 62 – column 11, line 22: "Non-linear enhancers per se are well known in the art . . ." (Faroudja goes on to describe the art of non-linear enhancers in great detail. There is no mention of any adaptive behavior.)

The Examiner responds:

> "Since the output of the motion-adaptive line doubler [106] is inputted to the non-linear enhancement, *the non-linear enhancement is considered to be adaptive*. Thus, the claimed 'adaptive filtering' is anticipated by the non-linear enhancer because the input of the non-linear enhancer is adaptive." (final rejection, page 3, emphasis added)

Appellant cannot accept the Examiner's reasoning. One of ordinary skill in the art of video signal processing knows that a filter is not considered to be adaptive merely because it receives its input from an adaptive circuit. For example, consider a simple Finite Impulse Response (FIR) filter which receives its input from an adaptive circuit. Does it follow that the

simple FIR filter is therefore adaptive? No, of course not—one of ordinary skill in the art knows that a simple FIR filter is not adaptive. For the same reason, one of ordinary skill in the art would not consider Faroudja's non-linear enhancer to be adaptive.

More fundamentally, Appellant points out that the claim language recites "adaptively filtering the up-sampled slower rate video signal." That is, the up-sampled video signal is adaptively filtered. The fact that Faroudja's line-doubler is adaptive is irrelevant; regardless of how it operates, the output of Faroudja's line-doubler is just a line-doubled signal (column 5, lines 57-59), and *this* is the signal that claims 1, 3, and 5 require to be adaptively filtered. This is especially clear in the phrasing of claim 3: "an adaptive filter based on a human vision model for interpolating the up-sampled video signal." Faroudja does not describe this. Faroudja's line-doubled signal is filtered by the non-linear enhancer, and **Faroudja's non-linear enhancer is not adaptive.**

Second, Faroudja does not describe "up-sampling the slower rate video signal to [any] desired rate." The Examiner asserts under various theories that Faroudja's line-doubler anticipates this limitation, but Appellant disagrees because Faroudja's line-doubler does not up-sample to "any desired rate"—it merely doubles the rate.

There has been some inconsistency in the Examiner's treatment of the claim language "any desired rate." In initially stating the grounds of rejection, the Examiner accepted that the claims recite "any desired rate." However, in responding to Appellant's subsequent arguments, the Examiner changed his position and asserted that the claims do not recite "any desired rate," merely "desired rate." Appellant argued that, according to the well-known rules of antecedent basis, the word "any" in the preamble is implicit in the body of the claim. In the advisory action,

the Examiner apparently returns to his original position by acknowledging "any desired rate," however now he asserts a new argument:

> "Faroudja discloses in col. 9, lines 48-50 that "By altering the output clock to differ *slightly* from twice the input clock, one can obtain 1049 or 1051 lines every 1/30 sec.' Thus, from the above passage, it is clear that the line doubler can up-sampling the slower rate video signal to any desired rate . . ." (emphasis added)

Appellant disagrees that the cited text anticipates "any desired rate." To shed light on Faroudja's meaning of "slightly," see column 9, lines 35-43: The relationship between the output and input clock frequencies is preferably $(2n \pm 1) / n$. In the "+" case, plugging in n = 525 for NTSC and n = 625 for PAL yields 2.0019 and 2.0016 respectively—de minimis deviations from 2.0. Again: Faroudja's line-**doubler** does not up-sample its input to "any desired rate." It merely doubles the rate.

For all these reasons, claims 1, 3, and 5 are not anticipated by Faroudja. Accordingly, Appellant requests that the rejection of claims 1, 3, and 5 under 35 U.S.C. § 102(b) be reversed.

Rejection of Claims 2, 4, and 6 under 35 U.S.C. § 103(a)

The Examiner rejected claims 2, 4, and 6 as being unpatentable over Faroudja in view of Zhu.

Appellant maintains that claims 2, 4, and 6 are not rendered obvious by Faroudja in view of Zhu because the Examiner has not established a *prima facie* case of obviousness. Specifically, the Examiner has not properly ascertained the scope and content of the cited prior art. MPEP E8R6 § 2141, citing *KSR International Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 82 USPQ2d 1385 (2007).

Neither Faroudja (as discussed above) nor Zhu nor their combination describes or suggests "adaptively filtering" or "up-sampling the slower rate video signal to [any] desired rate."

Furthermore, neither Faroudja nor Zhu nor their combination describes or suggests "restoring a direct current level for the smooth interpolated video signal." The Examiner writes that this limitation is met by Zhu's restoration of the full vertical resolution where at least one of the horizontal scan lines have been repeated or replaced with a constant value, but Appellant maintains that one of ordinary skill in the art would understand Zhu's restoration of full vertical resolution to be completely different from "restoring a direct current level" of a video signal. A DC restorer is "a circuit used in picture monitors and waveform monitors to clamp one point of the waveform to a fixed DC level." See NTSC Systems Television Measurements, Section 7, "Glossary of Television Terms," dated 1999, submitted via IDS on June 27, 2007 and available at http://www.tek.com/Measurement/App_Notes/25_7049/eng/section7.pdf. Zhu teaches no such circuit.

For these reasons, Appellant requests that the rejection of claims 2, 4, and 6 under 35 U.S.C. § 103(a) be reversed.

Conclusion

For all these reasons, Appellant requests that the Examiner's rejection of claims 1-6 be reversed, and that this case be passed on to issuance.

Respectfully submitted,

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Claims Appendix

1. (Previously Presented) An apparatus for providing a smooth interpolated video signal at any desired rate from a slower rate video signal comprising:

means for up-sampling the slower rate video signal to the desired rate; and

means for adaptively filtering the up-sampled slower rate video signal using a human vision model to produce the smooth interpolated video signal.

2. (Original) The apparatus as recited in claim 1 further comprising means for restoring a direct current level for the smooth interpolated video signal.

3. (Previously Presented) An apparatus for providing a smooth interpolated video signal at any desired rate from a slower rate video signal comprising:

a frame converter for up-sampling the slower rate video signal to produce an up-sampled video signal at the desired rate; and

an adaptive filter based on a human vision model for interpolating the up-sampled video signal to produce the smooth interpolated video signal.

4. (Previously Presented) The apparatus as recited in claim 3 further comprising a direct current restorer having as inputs the smooth interpolated video signal from the adaptive filter and the up-sampled video signal for restoring a direct current level in the smooth interpolated video signal.

5. (Previously Presented) A method of providing a smooth interpolated video signal at any desired rate from a slower rate video signal comprising the steps of:

up-sampling the slower rate video signal to the desired rate to produce an up-sampled video signal; and

adaptively filtering the up-sampled video signal according to a human vision model to produce the smooth interpolated video signal.

6. (Original) The method as recited in claim 5 further comprising the step of restoring a direct current level in the smooth interpolated video signal as a function of the up-sampled video signal.

Evidence Appendix

No evidence was submitted pursuant to 37 C.F.R. §§ 1.130, 1.131 or 1.132, and no other evidence was entered by the Examiner.

Related Proceedings Appendix

There are no related proceedings identified in this Brief.